BULLETIN OF THE ALLYN MUSEUM

Published by
THE ALLYN MUSEUM OF ENTOMOLOGY
Sarasota, Florida

Number 32 17 February 1976

LARVAL FOODPLANTS AND LIFE HISTORY NOTES FOR SOME METALMARKS (LEPIDOPTERA:RIODINIDAE) FROM MEXICO AND TEXAS[1]

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This is the third in a series of papers on reared Texas/Mexican Rhopalocera. The 2 earlier papers are: Kendall (1975) and Kendall & McGuire (1975). In this paper, rearing data are given for 14 species of riodinids, 7 of which are found also in Texas, and 2 of these (*Apodemia chisosensis* and *Calephelis rawsoni*) are known only from Texas at this time. It is interesting that no myrmecophilous associations have been observed with immatures of any of these 14 species; conversely, I have found many such associations in my rearing of lycaenids. Collections in Mexico were made in the same area as given in the 2 earlier papers; *ca.* 55 km radius from Ciudad Mante, Tamaulipas.

For ease of reference, species are arranged alphabetically by genus within each subfamily (Euselastiinae, Riodininae). No attempt is made to give range distribution for the species except within Texas. Hoffmann (1940) gave general distribution of the species within Mexico. For the *Calephelis* species, McAlpine (1971) gave general distribution data. Although McAlpine cited several of my larval foodplant records, he gave no substantiating rearing data. Comstock & Vázquez (1961) did not find immature stages of any riodinids in Mexico, but they did cite an earlier record for *Lymnas pixe* (Bdv.); Seitz (1924). The principal botanical references used are Standley (1920-1926) and Correll & Johnston (1970).

ABBREVIATIONS AND COLLECTOR INITIALS. AMNH - American Museum of Natural History, BRGS - Bentsen-Rio Grande Valley State Park, CDF - Clifford D. Ferris, CJD - C. J. Durden, CVC - Charles V. Covell II, ECK - Edward C. Knudson, FLS - Falcon Lake State Park, FRH - Frank R. Hedges, GC - George Connor, GWR - George W. Rawson, HAF - Hugh Avery Freeman, JAS - James A. Scott, JBS - J. Bolling Sullivan III, JBV - John B. Vernon, JDM - J. D. Mitchell, JEH - John E. Hafernik II, JFD - Joseph F. Doyle III, JLH - Jack L. Harry, JMB - John M. Burns, JRH - John Richard Heitzman, JWT - James W. Tilden, K&K -

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EUSELASIINAE

Euselasia hieronymi (Godman & Salvin) 1868

This species was found very common at times in Mexico. The reason for this became apparent following rearing. Early instar larvae start feeding by forming a compact circle, heads together, and they eat only the epidermis as they back away from the starting point; fourth instar larvae eat the entire leaf, starting at the leaf edge. Larvae are gregarious until pupation, they are processional following one another in a single rank, and they are not cannibalistic. A similar larval habit was noted by Scudder (1889) for *Euselasia gelon* (Stoll). Perhaps all *Euselasia* species lay their eggs in large clusters, with similar larval habits.

REARING RECORDS. On 31-XII-74, nr. Gomez Farias, Tamaulipas, Mrs. Kendall found 12 larvae feeding gregariously on the foliage of *Eugenia capuli* (Schl. & Cham.) Berg, MYRTACEAE. At first these were thought to be moth larvae. All larvae spun-up night of 6-I-75, and all pupated before 2000 hrs. 7-I-75. Six pupae were preserved; the others emerged 15-I-75 (1♀), 16-I-75 (5♀). At El Salto Falls, San Luis Potosí, 16-I-75, I collected 1 cluster of about 40 eggs and 2 clusters of larvae (1st & 2nd instar) of about 40 each on the undersurface of a leaf of a small (50 cm) *E. capuli* plant. About 50 larvae, various instars, 12 pupae, and the entire cluster of eggs were preserved. Thirty-five larvae pupated: 8-II-75 (1), 9-10-II (32), 11-II (2); adults emerged 21-II-75 (2♀), 22-II (3♂, 10♀), 23-II (6♂, 2♀).

RIODININAE

Anteros medusa Druce 1874

This small, colorful metalmark was found infrequently, 1 or 2 at a time, feeding on blossoms or perching, at most collecting sites within the study area. The larva, completely clothed with long white hairs, has a bright yellow verrucose patch on the first segment which is lost in the last instar. Apparently, larvae eat various Euphorbiaceae.

REARING RECORDS. On 9-I-74 at Rancho Pico de Oro, nr. Los Kikos, Tamaulipas, 1 last instar larva was found feeding on an undetermined scandent shrub; it died before pupation. At El Nacimento, Rio Mante, nr. Ciudad Mante, 10-XI-74 a ♀ was observed attempting to oviposit on the undersurface of a leaf of *Croton niveus* Jacq., EUPHORBIACEAE. This ♀ was netted and kept alive for possible egg production, but it had lost 2 legs when caught, and it refused to oviposit in captivity. Again, at Rancho Pico de Oro, 11-XII-74, 1 early instar larva was found feeding on the foliage of *Phyllanthus adenodiscus* Muell., EUPHORBIACEAE; it pupated 12-I-75, and a ♀ emerged 21-I-75.

Apodemia chisosensis H. A. Freeman 1964

This species, described and known only from 3 specimens collected in VIII-62, is endemic to Big Bend National Park, Brewster Co., Texas; it probably occurs in the mountains of adjacent Mexico where its larval foodplant, *Prunus harvardii* Wright, ROSACEAE, grows. The principal flight is about mid-May.

Eggs are deposited singly on the undersurface of leaves, usually deep within the foliage. Larvae construct leaf shelters from which they forage. Most premature larvae enter diapause which takes place on the ground under dead leaves and debris. A few larvae, probably those without inherited idapausal character, mature, pupate and emerge in early August of the same year; the great majority in May of the following year. Thus, the insect has remained absent in collections (type series excepted) since it was described.

REARING RECORDS. On 17-V-73, W. W. & Nadine McGuire joined Mrs. Kendall and me for a few days of field work in the park. Proceeding up Green Gulch to the type locality, we found adults both common and fresh; however, after 3 days they became quite worn, indicating that peak emergence had passed. On 18-V, everyone started stalking ♀ to determine oviposition substrates. The McGuires soon observed 2 ♀ ovipositing on the foliage of *P. harvardii.* Many eggs were deposited by 3 captive ♀. These eggs, with a limited amount of the larval foodplant, were transferred to the lab in San Antonio. Later, most of the early instars were preserved due to a foodplant shortage. Of the remaining larvae, all except 3 entered diapause; these 3 pupated before 7-VIII, and adults emerged 5-VIII (1♂), 10-VIII (1♂), 19-VIII-73 (1♀).

Larvae were caged over 2 small shrubs that had been transplanted to the lab garden. Examination of an oak leaf on the ground beneath one of the caged plants disclosed 9 larvae in diapause on 1-XII-73. Reexamination, 5-III-74, disclosed the larvae still in diapause. Still another examination about mid-March disclosed the plants had died and the larvae had broken diapause and died of starvation.

Apodemia hypoglauca Godman & Salvin 1878

Only 1 example of this Mexican species was seen and collected: a ♀ ovipositing on a leaflet of *Acacia pennatula* (Schlecht. & Cham.) Benth, LEGUMINOSAE, 16-XI-74 at El Salto Falls, San Luis Potosí. This ♀ deposited 7 more eggs in captivity on 17 & 18-XI, and died 19-XI-74. The first egg hatched *ca.* 0700 hrs. 25-XI-74; others later in the day. The supply of *A. pennatula* brought to the field lab and kept under refrigeration had dired out and was unacceptable to the young larvae. These larvae were offered juvenile foliage of other *Acacia* species which they refused and soon died.

Apodemia mormo mejicanus (Behr) 1865

This species, described from the Sierra Madre nr. Mazatlán, Mexico, has been field collected in 7 west Texas counties from late March to early October. It appears to have 3 full broods with considerable overlapping. It may also have a larval diapause. A known larval foodplant in Texas is *Kramaria glandulosa* Rose & Painter, KRAMERIACEAE. Possibly 1 or 2 other species in the genus, which grow in the same area as the insect, may be acceptable to larvae. These plants should be examined by collectors, both in Mexico and the United States, to determine the extent to which *mejicanus* uses them.

The life history of *mejicanus* was worked out in Texas by Jack L. Harry. A brief note to this effect appeared in the News Lepid. Soc. (1973 - Field Season Summary) 2:8, 1974, for its synonym *Apodemia duryi* (Opler & Powell, 1962). Additional substantiating rearing data were provided me vis-a-vis and in personal correspondence, and these data are given here.

REARING RECORDS. On 12-IV-73, 30 mi. N. of Van Horn, Culberson Co., Texas, Mr. Harry collected an egg-laying ♀ and obtained additional eggs from it in captivity on *K. glandulosa.* These eggs hatched 22-IV-73, but all were lost. Mr. Harry collected another ♀ 3-V-73, SW base of Guadalupe Peak, Culberson Co., Texas, which was also ovipositing on *K. glandulosa.* This ♀ deposited *ca.* 100 eggs in captivity, and they hatched 11-15-V-73. All larvae died except 10 which were preserved, and 5 which pupated 19-VII-73; adults emerged 29-VII-73 (1♂), 5-VIII

(1♂), 6-VIII (2♂, 1♀). Mr. Harry kindly placed the preserved immatures (5 eggs, three 1st, three 2nd, three 3rd, and one 5th instar larvae) in my collection.

ADDITIONAL TEXAS RECORDS. BREWSTER CO.: Alpine, 30-V-40, HAF; Big Bend Nat. Park, 14-IX-60, KR; 16 km N Alpine, 1,676 m, 15-IX-60, LDM; Chisos Mts., 13-IV-63, HAF; Lejitas, 7-IX-65, K&K; 34 km S Alpine, 20-IX-70, JAS; 29 km S Alpine, 28-IV-73, JAS. CULBERSON CO.: 4.5 km W Van Horn, 30-IV-61, Nickle 10-V-64, KR; 48 km N Van Horn, 12-IV-73, 40 km N Van Horn, 20-IV-73, 25-IV-73, 21 km S & 16 km E Van Horn, 21-IV-73, 28-IV-73, 97 km N Van Horn, 30-IV-73, 2-V-73, 17-V-73, all JLH. EL PASO CO.: McKelligan Canyon, Franklin Mts., 28-III-59, WDP; 29-IV-61, KR; 3-IV-71, K&K. HUDSPETH CO.: nr. Sierra Blanca, 20-VI-63, JWT (1974). JEFF DAVIS CO.: nr. Ft. Davis, 1,555 m, in AMNH (also Opler & Powell, 1962) (6♂, 5♀), 1-10-V-28, 1-15-VI-28; 15-30-VII-28, OCP; 16 km E & 8 km N Quebec Siding, 17-V-73, 36 km S Van Horn, 25-VIII-73, JLH. PRESIDIO CO.: Chinati Mts., 23-IX-29 (1♂, 2♀) (*A. cythera*) and 30-IX-29 (1♀) (*A. duryi*) Tinkham (1944); 32 km W Alpine, 17-IV-60, KR; Shafter, 7-X-63, JWT (1974). VAL VERDE CO.: 21 km W Del Rio, 19-IX-74, WWM.

Calephelis perditalis (Barnes & McDunnough) 1918

Described from San Benito, Texas, this metalmark has been collected in 20 Texas counties from Burnet south to Cameron and then up the Rio Grande to Val Verde. There is one old record from Kerrville, Kerr Co. ("Kerrville, Coppach," no other data). The insect is most common where *Eupatorium odoratum* L., COMPOSITAE, grows (San Patricio to Hidalgo and Cameron counties). Although *E. odoratum* is the only confirmed larval foodplant, I have found the insect closely associated with *E. serotinum* Michx. and *E. betonicifolium* Mill. over other parts of its range. McAlpine (1971) mentions its larval foodplant but gives no substantiating data. This species has 4 or 5 broods with as much as 1 month overlap of a single brood. It has been collected each month of the year except February. It is most abundant about mid-October in the extreme southern portion of its range, but it is common at other times. It is least likely to be found from December through February.

REARING RECORDS. Kenedy Co., US Hwy 77 about 9 km S of Sarita, 5 ♂ were collected 28-X-65 flying about *E. odoratum*. Three days later, at this same spot, 1 ♂ and 1 ♀ were netted; others were seen. The ♀ was kept alive for possible egg production. By now I had decided that *E. odoratum* was most likely a larval foodplant because of numerous insect-plant associations at widely dispersed locations. In the lab, more than 125 eggs were deposited, mostly in leaf axils, by this ♀, a few each day 1-19-XI-65. Eggs started hatching 9-XI-65. Larvae were placed on a twig of *E. odoratum* in a vial of water, which was then placed inside an open container. Larvae did not wander off. When fully mature, a few larvae crawled under the container rim to pupate, but most of them pupated on the bottom of the container under paper. Last instar larvae are characterized by a tuft of short white hairs on each of the first 3 segments; the first 2 tufts are triangular or pointed cephalad. Seventy-seven larvae pupated 8-29-XII-65. Some pupae turn dark the day of pupation; others remain light green for several days. Seventy-six adults (32♂, 44♀) emerged from 18-XII-65 to 9-I-66; had these pupae been kept in an outdoor environment they would have eclosed much later. A quantity of all immature stages was preserved. Live pupae were furnished Dr. C. L. Remington for chormosome studies. Examples of adults were placed in the AMNH, and LACM; still others were given to Mr. Wilbur S. McAlpine for revisionary studies.

San Patricio Co., Lake Corpus Christi State Park, 4-VI-67, 7♂, 2♀, including a pair in copula, were collected. The mated ♀ was placed in a jar with *E. odoratum,* and eggs were deposited the same day. Many eggs were deposited 4-13-VI when she was placed in a killing jar. Eggs started hatching 9-VI-67. One hundred thirty-two larvae pupated by 4-VII; 11 of these were preserved. One hundred twenty-one adults (58♂, 63♀) emerged from 30-VI to 11-VII-67. Again, in the same county, on

10-VIII-68 at the Welder Wildlife Foundation Refuge nr. Sinton, adults were found common. One ♀ collected and kept alive deposited many eggs on 11 & 12-VIII. The eggs hatched in due course, and 55 larvae pupated 2-30-IX-68; an equal number of adults (36♂, 19♀) emerged from 9-IX to 9-X-68.

Bexar Co. Early in 1966, I introduced *E. odoratum* into my lab garden in San Antonio. On 3-VII-67, a fresh ♀ was collected in the lab garden, examined and released. It flew directly to the *E. odoratum* and was still sitting there 15 minutes later when the watch terminated. Since then adults have become established in the lab garden. On 6-VIII-73, I counted 6 last instar larvae on this plant, 3 of which were collected. The 3 collected pupated 9-10-VIII, and adults emerged 16-VIII-73 (2♂, 1♀).

EARLY (PREDESCRIPTION) RECORDS. Lintner (1884), Hidalgo Co., 7 mi. N of Hidalgo, 14-IV to 20-V-1878 (1), *leg.* G. B. Sennett; Lintner recorded this species as *Charis caenius* (L.). Aaron & Aaron (1885), Nueces Co., Corpus Christi beach, ?-IV-1883 (very common), and 25 mi. NW of Corpus Christi, early VII-1883 (very common), all *leg.* S. F. Aaron; they too recorded these specimens as *C. caenius*. Snow (1905), Cameron Co., Brownsville, 6-VI to 8-VII-1905; recorded also as *C. caenius*. Bradley (1919), Wilson Co., Southerland Springs, 26-VI-1917; Bexar Co., Helotes, 1-VII-1917 (several).

SOME MUSEUM SPECIMENS. The AMNH has 39♂, 45♀ some of which are labeled "Southern Texas," and "Esper Ranch, Brownsville." Others having more specific data are arranged here by Texas county although no county name appears on the label: Bexar Co., San Antonio, X, XI. Cameron Co., Brownsville, VI, X (Sperry); San Benito, VII; Southmost, VII (Buchholz). Hidalgo Co., Pharr, III, IV, V, VI, VII (Buchholz). Kenedy Co., Sarita, IX, X, (N. Glazbrook). Live Oak Co., 80 mi. S of San Antonio, XI (A. H. & S. K. Rindge). Nueces Co., Corpus Christi, X (C. A. Ellis). Webb Co., Laredo, VI. Carnegie Museum: Holland (1931) stated: "we have it from San Antonio and Comfort [Kendall Co.] Texas." USNM: Barnes & Mc Dunnough (1918) stated: "our type series (6♂, 6♀) having been captured at San Benito, Texas, in the latter portion of July; we have also specimens from Brownsville, taken in October . . ."

OTHER TEXAS RECORDS. BEE CO.: Near Skidmore, 3-IX-62, 7-IX-64, K&K; 20-IV-68, 15-IX-68, MAR. BEXAR CO.: San Antonio, 29-VI-57, LSP; San Antonio (lab garden), 3-VII-67, 25-VII-70, 24-VII-72, 10-16-VIII-73, 26-VIII-73, 8 & 9-IX-73, 30-IX-73, 8-VIII-74, K&K; same location, 20-VI-73, CVC. BURNET CO.: 4 mi. E Marble Falls, CJD. CAMERON CO.: Brownsville, 24-IV-43, 2-XI-45, 16-XI-50, 18-XI-50, 14-XI-51, 2-XI-54, P&P; 18-X-63, 21-24-X-63, 12 & 13-XI-63, JWT; 18-VII-64, 21-VIII-64, 22-VIII-64, 2-V-65, 3-V-65, 26-VI-65, 27-VI-65, 4-VII-65, 3-IX-67, 6-XI-69, 19-X-72, 21-X-72, K&K; ?-VIII-64, ?-VI-66, HAF; 13-15-IV-65, 20-23 & 26-VI-66, 19-VI to 1-VII-69, JRH; 22-XII-66, NBT; 26-VIII-68, 13-VII-69, JFD; 29-V-68, 21 & 23-VII-68, 26-X-69, 19 & 20-V-71, 10-VI-71, 6-VII-71, MAR; 26-VI-69, 13-VII-69, CDF, *leg.* JBS; 19-X-73, WWM; N of Combes, 12-XI-62, P&P; 4 mi. W Boca Chica, 20-X-63, Villa nueva, 25-X-63, Port Isabel, 24-X-63, Southmost, 29-X-63, JWT; Harlingen, 17-VII-64, 23-VIII-64, 10-X-64, Tex. Hwy 100 x US 77, 10-X-64, Tex. Hwy 511 x 1419, 4-XII-64, Harlingen, 29-X-65, US Hwy 281 x 1577, 29-IX-68, Santa Maria, 8-XI-69, 14-XI-71, 15-XI-71, Southmost, 9-XI-69, 10-XI-69, Laguna Atascosa Nat. Wildlife Refuge, 21-XI-73, 23-XI-73, all K&K; San Pedro, 11, 12, 14-IV-65, 20, 25-VI-66, Palo Verdi Preserve, 12-IV-65, JRH; nr. Santa Maria, 6-V-68, JBS; Southmost, 6-VII-71, 21-VIII-71, MAR; US Hwy 281 x 802, 8-VIII-69 GC (recorded as *C. virginiensis*). COMAL CO.: New Braunfels, 19-VII-69, JBS; New Braunfels, 9-IV-72, WWM. DUVAL CO.: 9 mi. S Freer, 12-XI-71, K&K. GUADALUPE CO.: 8 mi SE Sequin, 5-VII-69, JFD. HIDALGO CO.: Pharr, 11 & 13-XI-62, BRGS Park, 13-XI-62, P&P; SANW Refuge, 11-XI-63, JWT; SANW Refuge, 28-III-64, 11-XI-68, 12-I-72, 17-X-72, K&K; SANW Refuge, 10 & 15-IV-65, 21-VI-66, 22, 24 & 25-VI-68, BRGS Park, 28-VI-68, JRH; 2 mi. W McAllen, 5-V-68, Progreso, 6-V-68, JBS; SANW Refuge, 22-VI-68, 31-VIII-68, 12-VII-69, 4-VII-71, 5-VII-71, 31-X-71, Relampago, 6-VII-71, Madero, 29-X-71, MAR; SANW Refuge, 27-VIII-68, JFD; BRGS Park, 27-VI-73, CDF, *leg.* D. E. Allen; SANW Refuge, 10-X-73, WWM. KENEDY CO.: 6 mi. S Sarita, 10-XI-62,

P&P; 20 mi. S Sarita, 23-VIII-64, nr. Sarita, 23-IV-67, K&K. KLEBERG CO.: 1 mi. S Kingsville, 23-VIII-64, 27-VI-65, K&K. NUECES CO.: Calallen, 24-VII-65, K&K. SAN PATRICIO CO.: LCCS Park, 12-X-63, 7-XI-63, WWF Refuge, 2-6-XI-63, JWT; LCCS Park, 24-VII-65, 23-IV-67, WWF Refuge, 18-VI-67, 10 & 11-VIII-68, 31-VIII-68, K&K; LCCS Park, 16 & 17-VI-66, 15-19-VI-68, 14-17-VI-69, 1 & 2-VII-69, JRH; WWF Refuge, 3-V-68, JBS; LCCS Park, 20-IV-68, 28-IV-68, 22-II-69, 23-III-69, 29-III-69, MAR; LCCS Park, 4-VI-67, 11-VIII-68, 5-IV-69, JFD. STARR CO.: FLS Park, 3-XII-64, K&K. TRAVIS CO.: 9 mi. NW Austin, 1-IX-68, 21-IX-68, 19 & 27-X-68, 28-VI-69, 12-VII-69, Austin, 31-VIII-68, 1-XII-70, CJD. VAL VERDE CO.: Del Rio, 15-VII-69, JBS. WILLACY CO.: Lyford, 2-VII-65, 28-X-65, 23-IV-67, K&K.

Calephelis rawsoni McAlpine 1939

Described and known only from Texas at present. The range and habitat of this metalmark appear to be chiefly along the Edwards Plateau escarpment westward into the Chisos Mountains, and Presidio Co. An exception to this is a fresh ♂ which I collected at Lyford, Willacy Co., in far south Texas. Other counties include Travis, Hays, Comal, Bexar, Kendall, Kerr, Uvalde, and Brewster. It seems to prefer a semi-shaded habitat among limestone outcroppings where the larval foodplants grow. The known larval foodplants extend into Mexico; doubtless the insect also occurs there. McAlpine (1971) mentioned these foodplants but gave no substantiating data. He further stated (p. 53): "... the types are deposited in the U. S. National Museum." Actually, the ♂ holotype and 1 ♂ paratype are in the AMNH.

The insect is multiple brooded, possibly 5 with some overlapping. Females deposit their eggs in the leaf axils. Adults have been field collected in March, May, and June through November. I have reared it from 6 of the 8 Texas counties representing its present range. Reared examples have been placed in the AMNH and the LACM. Examples were also provided Mr. Wilbur S. McAlpine for revisionary studies, Dr. C. L. Remington for chromosome studies, Mr. Harry K. Clench and Dr. John C. Downey for pupal characteristic studies.

REARING RECORDS. Comal Co. At Landa Park in New Braunfels, 19-VI-65, 8 last instar larvae were collected feeding on the foliage of *Eupatorium havanense* HBK, COMPOSITAE. These larvae pupated 21-26-VI-65, and 4 adults (2♂, 2♀) emerged 28-30-VI-65. Two larvae and 2 pupae were preserved. At the same location and date, 4♂, 1♀ were collected, the ♀ was kept alive for egg production, but it died after depositing 1 egg which hatched 27-VI; the larva ate *E. havanense,* and it pupated 19-VII; a ♀ emerged 26-VII-65. Kerr Co., Texas Hwy 16, about 16 km SW of Kerrville, 1♂, 2♀ were collected 31-VII-65 feeding on the blossoms of *Phyla lancelota* (Michx.) Greene, which was growing within a few m of *E. havanense.* In the lab both ♀ deposited numerous eggs from 31-VII through 9-VIII, and both died 10-VIII-65. Eggs deposited 9-VIII were preserved; the others started hatching 6-VIII. Larvae ate *E. havanense* and 129 pupated from 24-VIII to 3-IX-65. From these pupae, 123 adults (63♂, 60♀) emerged from 31-VIII to 16-IX-65. Except for 5♂ from among which Mc Alpine (1939) selected the holotype, no other examples are known to have been taken in this county. Although the type locality is given as Kerrville, Kendall & Kendall (1971) pointed out that it is unlikely the specimens actually were collected in Kerrville, but probably near there. Uvalde Co., Garner State Park, 14-VIII-65, several adults were seen flying around *E. havanense* at about 1700 hrs. One ♀ was observed depositing an egg deep in the foliage of this plant. Although the approach of dusk impaired visibility, 2♂, 2♀ were collected. In the lab, 1♀ died the following day without ovipositing, the other deposited eggs from 15-29-VIII and died 31-VIII-65. The first egg hatched 20-VIII, the last on 1-IX-65. Fifty-two larvae pupated from 4-30-IX. Several eggs, larvae and 19 pupae were preserved. From the remaining pupae, 33 adults (14♂, 19♀) emerged between 12-IX and 10-X-65. Travis Co., on 23-VII-66, following a lead given me by Dr. Jack C. Vaughn where he had collected a ♂ in V-63, Mrs. Kendall and I soon found a likely habitat for *rawsoni* off Bull Creek Road,

NW of Austin. One ♂ and 1 ♀ were collected. The ♀ was confined in a jar with a sprig of the foodplant from the collecting site, and was then placed in the car trunk. By 1400 hrs. the following day 55 eggs had been deposited in total darkness. Adult food was provided by placing cotton, moist with sugar water, on the screened lid. In the lab additional eggs were deposited on 25 & 26-VII for a total of 91. First eggs hatched 28-VII. Fifty-one larvae pupated 11-19-VII, and 45 adults (21♂, 24♀) emerged 19-25-VIII-66. A series of immature stages was preserved. Kendall Co., at Edge Falls, a private picnic area on the Guadalupe River about 7 km S of Kendalia, a worn ♀ was collected 5-XI-66. In the lab this ♀ deposited 11 eggs, 5 & 6-XI on *E. havanense* and then died. These eggs hatched 14 & 15-XI. Five larvae pupated 18-28-XII, and 5 adults (2♂, 3♀) emerged 12-22-I-67. Brewster Co., near the chlorination plant, in the Basin of Big Bend National Park, 6♂, 2♀ were collected 15-VIII-66. These adults were flying about a clump of *Eupatorium greggii* Gray. One of the ♀, not yet dry, was found hanging from a cactus pad growing in the clump of *E. greggii*. On the following day another ♂ and ♀ were collected. The 2 flown ♀ were kept alive for eggs. In the field lab, 1 ♀ deposited 180 eggs on *E. greggii* between 15-23-VII, and then died. The other deposited 39 eggs (6 of which were on *E. havanense*) 17-22-VIII and then died. Eggs started hatching 22-VIII. The larvae readily ate both species of *Eupatorium,* and 79 pupated 11-17-IX; 74 adults (39♂, 35♀) emerged 20-27-IX-66. A series of immature stages was preserved.

OTHER TEXAS RECORDS. BEXAR CO.: 3 & 7-VIII-19, GWR; 30-VIII-39, SCT; 11-X-63, Tilden (1974); 17-VII-66, 27-X-66, 6-XI-66, K&K; 21-X-67, JFD. BREWSTER CO.: 10 & 11-VI-08, JDM & RAC; 8 & 9-VIII-61, HAF; 6-X-66, 7 & 8-X-67, 14-IX-71, 29-IX-72, K&K; 23-VI-63, Tilden (1974); ?-VII and ?-VIII-68, JEH; 9-VIII-67, 27-IV-73, JAS. COMAL CO.: 30-V-42, 29-VI-63, HAF; 23-III-64, 2-VIII-65, WSM; 31-X-64, 7-XI-64, 11-XI-64, 28-X-71, 4-VIII-73, K&K; 3-XI-68, JFD; 19-VII-69, 21-X-71, 24-X-71, MAR; 18-IX-71, JEH; 2-IV-72, 23-IV-72, 29-V-73, 14-X-73, WWM; 29-X-72, Tilden (1974). HAYS CO.: 28-VI-63, JBS. KERR CO.: McAlpine (1939, 1971) ?-VII-08, *leg.* Lacey, *cf.* Kendall & Kendall (1971). PRESIDIO CO.: ?-VI-68, ?-VII-68, ?-VIII-68, JEH. TRAVIS CO.: 25-V-67, JMB; 27 & 28-VII-68, 4, 18, 24 & 25-VIII-68, 8, 15, 21, 22 & 29-IX-68, 6, 12, 13, 19 & 29-X-68, 3-XI-68, 10 & 11-V-69, 7, 14, 21, 22 & 28-VI-69, 12, 20 & 27-VII-69, 4, 5 & 19-X-69, 19 & 25-VII-70, 5, 12, & 20-IX-70, 1 & 30-XI-70, all JCD. WILLACY CO.: 2-VII-65, K&K.

Calephelis virginiensis (Guérin-Méneville) [1831]

Prior to 1966 this species was known in Texas from 3 early records only: 2 specimens in the USNM; 1 (Barne's Coll.) labeled "Black Jack Springs," and 1 (B. Neumögen Coll.) simply "Texas." Black Jack Springs was a small village prior to 1836 located *ca.* 16 km W of La Grange, Fayette Co., Texas. Snow (1905) published a third record from Galveston, Galveston Co., ?-V-04. Rickard (1967) collected a series of this species at Houston, Harris Co., from 1-IX to 16-XI-66. On 24-III-67 he observed a ♀ oviposit on the foliage of *Cirsium horridulum* Michx., COMPOSITAE (*det.* Kendall), and reared a few through. The immature stages will be described by Rickard. The habitat of *virginiensis* is open piney woods where the larval foodplant grows. It has been collected in 6 Texas counties from March to May and July to November, indicating at least 3 full broods and possibly 4. Excluding Fayette and Galveston counties, these collection records are: HARDIN CO.: 31-VII-73, 1-VIII-73, WWM. HARRIS CO.: 1, 6, 8, 20, 24 & 25-IX-66, 9 & 30-X-66, 8, 11-14 & 16-XI-66, 24-III-67, 3 & 8-IV-67, 7 & 8-V-67, all MAR; 24-IX-66, 11-XI-66, K&K. NEWTON CO.: 30-VII-72, FRH; 26-IV-73, WWM. ORANGE CO.: 19-VIII-72, 19-IX-72, 25 & 26-IV-73, WWM.

Caria ino melicerta Schaus 1890

Clench (1967) indicated that this subspecies, described from Mexico, is the one that occurs in Texas. Here it flies from late March to early December. Although

its larval foodplant, *Celtis pallida* Torr., ULMACEAE, is found throughout the Southern Plains, Edwards Plateau, and Trans-Pecos areas of Texas, the insect is usually found only in a small area from Bee to Cameron County, but occasionally it ranges inland to Comal County. Late November and early December adults produce larvae which enter diapause, climatically induced, in the last instar. This immature stage cannot, however, survive severe or sustained freezing temperatures (based on outdoor rearing at San Antonio), thus, the restricted spatial distribution. Diapausing larvae produce adults in late March and early April for the most part. In nature, eggs are deposited at the base of the leaf petiole. Larvae live in a leaf shelter; some are rolled, others are pulled together. These shelters often appear as dead shriveled leaves, sometimes hanging by a thread of silk, or they may give the appearance of having been lodged on a twig by wind or rain. Pupation occurs in the leaf shelter.

REARING RECORDS. San Patricio Co., 21-VIII-60, Lake Corpus Christi State Park, many adults were present; some were copulating in the morning sun. While collecting *Achlyodes thraso tamenund* (Edwards) larvae on *Zanthoxylum fagara,* 1 pupa of *C. i. melicerta* was found; it produced a ♂ 19-IX-60. At the same location, 22-X-60, 32 empty pupal cases, 3 live pupae, and 5 larvae were collected on *C. pallida.* Here *Z. fagara* and *C. pallida* grow together, the branches of each overlapping the other which accounted for the earlier discovery of the *melicerta* pupa on *Z. fagara.* The 3 pupae produced adults: 25-X (1♀), 30-X-60 (2♀). The 5 larvae pupated from 27-X-to 1-XI-60 and 4 adults emerged: 5-XI (1♀), 7-XI (1♀), 10-XI (1♂), 11-XI-60 (1♀); 1 pupa was parasitized. Once again at this location, 23-IV-61, 1 ♀ was collected and kept for eggs. Fifteen eggs were deposited on *C. pallida* twigs 24 & 25-IV after which it died. Immatures were lost through neglect.

Kleberg Co., 26-XII-60, at Kingsville City-County park, 8 larvae in diapause were collected on *C. pallida* in their leaf shelters. Kept in the lab at low humidity, they were all dead by 11-II-61. Five more larvae were collected at the same spot on a return visit 22-III-61. The deciduous larval foodplant was just putting forth new growth buds. Two of these larvae pupated 26-III and the remaining 3 on or before 31-III-61. Adults emerged: 5-IV (2♀), 6-IV (1♀), 13-IV-61 (2♂).

Live Oak Co., 27-XII-60, at La Parra Creek, *ca.* 21 km south of Oakville, 17 diapausing larvae were collected on *C. pallida.* These larvae soon died due to dehydration under fairly constant laboratory temperatures. At the same location, a gravid ♀ was collected 8-X-61 and kept alive for eggs. Confined over twigs of *C pallida* it deposited 144 eggs from 8 to 13-X and died 14-X-61. Eggs started hatching 18-X. Except for 2, all larvae were placed outdoors on a caged living plant 31-X. The 2 larvae kept in the lab pupated 22-XI; a ♀ emerged 2-XII and a ♂ on 3-XII-61. On 14-I-62, after a week of freezing temperatures, the lowest being 10° F, larvae in the outdoor environment were examined. Of 24 immatures found, 1 larva had pupated, and all were dead except 2 larvae which died later.

Cameron Co., 18-VII-64, Brownsville, 7 larvae were collected on a small (1 m) *C. pallida* seedling; 3 were parasitized; 4 pupated from 22 to 31-VII; 2♂, 1♀ emerged 28, 30 & 31-VII-64. At the same location, 21-VIII-64, 8 more larvae were collected; 2 were parasitized, and the others pupated from 27-VIII to 12-IX; 6 adults (3♂, 3♀) emerged from 2 to 21-IX-64. Once more at Brownsville, 29-X-65, a ♀ was collected and kept alive for egg production. A few eggs were deposited 1-XI, and these hatched 12-XI; 3 larvae pupated 25, 26 & 29-XII-65; 3 adults (1♂, 2♀) emerged 7, 9 & 12-I-66.

OTHER TEXAS RECORDS. BEE CO.: 20-IV-68, MAR. CAMERON CO.: 6-VI to 8-VII-05, Snow (1905); 3-V-57, 18 & 19-X-63, 28, 30 & 31-III-64, 18-VII-64, 10-X-64, 4-XII-64, 3-V-65, 4-VII-65, 29 & 30-X-65, 24 & 26-XI-66, 2-IX-67, 29-IX-68, 12-X-68, 10-XI-68, 6, 8 & 11-XI-69, 14-XI-71, 21-X-72, 20 & 21-XI-73, all K&K; 1-IV-59, WDP; 17-30-X-63, 11-13-XI-63, JWT; 11, 12, & 14-IV-65, 22, 24 & 25-VI-66, 20, 21 & 26-VI-68, 19-VI to 1-VII-69, JRH; 14-IX-65, KR; ?-VI-66, HAF; 21 & 23-VII-68, 13, 27 & 28-VII-69, 17 & 18-VIII-69, 18, 19 & 26-X-69, 8-XI-69, 19 & 20-V-71, 10-VI-71, 16-VIII-71, 18-X-71, all MAR; 17-VII-72, WWM. AMNH (22♂, 21♀) all Brownsville,

some VI, X, and others no date. LCAM (Martin & Truxal, 1955), 10 specimens, X, S. Texas. COMAL CO.: 4 & 19-X-75 (2♀), WWM. DUVAL CO.: 12-XI-71, K&K. HIDALGO CO.: 31-X-55, 4 & 5-XI-55, P&P; 28-IX-68, 9-IX-72, 17 & 22-X-72, K&K; 31-VIII-68, 7 & 21-IX-68, 12-X-68, 7-IV-69, 12 & 26-VII-69, 16 & 17-VII-69, 25-X-69, 9-VI-71, 4 & 6-VII-71, 14, 15 & 22-VIII-71, 19, 29-31-X-71, MAR; 21-IX-68, 24-XI-68, JFD; 11-IX-69, JAS; 20-V-72, 15 & 16-VII-72, 2-IX-72, 9-X-73, WWM. Miller (1970) 2-VIII-66, ?-IX-67. LIVE OAK CO.: 2-X-60, 8-X-61, K&K; 22-IX-68, 17-XI-68, 21-III-69, MAR. SAN PATRICIO CO.: 15-IX-63, 12-X-63, 14 & 15-VI-69, K&K; 22-IX-63, RBWS; 12-X-63, 7-XI-63, JWT; 16 & 17-VI-66, 15-18-VI-68, 14-17-VI-69, JRH; 16-IV-67, 20 & 28-IV-68, 23-III-69, MAR; 16-IV-67, 4-VI-67, 11-VIII-68, JFD.

Emesis emesia (Hewitson) 1867

This multiple brooded species, common in Mexico, is found occasionally in extreme south Texas where its equally rare larval foodplant, *Caesalpinia mexicana* Gray, LEGUMINOSAE, is found. Although native in southernmost Texas, this plant is sometimes grown as an ornamental; therefore, a good place to look for the insect would be in city flower gardens. Eggs are deposited beneath the leaflets. Larvae do not make protective shelters, but rest beneath leaves and on stems when not feeding.

REARING RECORDS. On 23-XII-73, W. W. and Nadine McGuire joined Mrs. Kendall and me for a day of collecting in the area around Ciudad Mante, Tamaulipas, Mexico. The first place we stopped was Paso del Abra about 20 km S of Ciudad Mante. Here *E. emesia* adults were present in fair numbers, and McGuire observed a ♀ oviposit on the undersurface of a leaf of *C. mexicana*. Examination by the group of several other plants disclosed many eggs and a few early instar larvae. More than 100 eggs were collected; a gravid ♀ was also kept for egg production. Some of the eggs collected in nature hatched enroute back to the motel. The live ♀ deposited 40 or more eggs from 24 to 31-XII when it died. Each time fresh foodplant was gathered, additional eggs and larvae were found; therefore, no separate accounting was made of the various immatures collected. Many immature stages were preserved. Some larvae were parasitized. Thirty-five larvae pupated between 27-XII-73 and 11-II-74; 26 adults (9♂, 17♀) emerged from 6-I-74 to 20-II-74.

TEXAS RECORDS. This species was first recorded for Texas and the United States by Stallings & Turner (1946); a series collected by H. A. Freeman, X and XI at Pharr, Hidalgo Co. More recently: 3-XI-73, FRH; 14-X-74, JBV; 23-XI-74, ECK, all from Hidalgo Co., and 24-X-74, WWM, Cameron Co.

Emesis liodes (Godman & Salvin) 1886

This species was collected only a few times at El Salto Falls, San Luis Potosí, Mexico: 23-XII-72 (1♂), 17-XI-74 (1♂, 1♀), 16-XII-74 (2♂, 1♀). Most interesting was the observance of 2 ♀, 17-XI-74, demonstrating oviposition behavior. Each of these ♀ was followed as it would alight on various plants momentrily in its search for a suitable oviposition substrate. They sampled plants at random from near the ground to a height of *ca.* 2 m. Eventually each was lost sight of in the dense undergrowth of the jungle. Once again, 16-XII-74, at the same location, another ♀ was followed for a while, but it too was eventually lost. An hour or so later I came upon a ♀ that had just located its larval foodplant, a 30 cm tall, undetermined woody seedling shrub with shiny green entire leaves. The plant was growing under an open canopy where the afternoon sun struck it. The ♀ repeatedly alighted on a dust covered basal leaf but each time would slide off. Eventually it clung to the 3 mm upright stem, curved its abdomen about the stem and began depositing eggs in a vertical row. For 15 minutes I squatted there with protective net held over both plant and insect. It was necessary to push the ♀ from her position with the inside rim of my net before she would abandon the egg laying operation; 7 eggs had been deposited. The entire plant was dug up, potted and transported to the field lab; it was then

discovered that 8 more eggs (6 already hatched) had been deposited on the upper surface of the basal leaf (previously mentioned) by still another ♀; these were preserved. The captive ♀ died during the night without depositing additional eggs. On 1-I-75 at 2100 hrs., 1 of the 7 eggs hatched, and still another during the night. The following morning neither larva could be found on the unprotected plant. The remaining 5 eggs did not hatch, and they were preserved 3-V-75.

Emesis mandana furor (Butler & Druce) 1872

In Mexico only a few examples of this large species (38-45 mm wing expanse) were seen, and 2 collected: Gomez Farias, Tamaulipas, 20-XII-72 (♀); El Salto Falls, San Luis Potosí, 23-XII-72 (♀). These adults were taken while feeding on blossoms of *Eupatorium odoratum*. The last mentioned ♀ was confined with a sprig of *E. odoratum,* and it deposited 38 eggs, 24 & 25-XII-72, mostly in leaf axils, but 8 were on the container surface. All the eggs were preserved except a few, and these hatched from 2-4-I-73, but the larvae refused *E. odoratum* and died.

On 27-I-74 at Gomez Farias, Mrs. Kendall found a pupa on a leaf of *Celtis caudata* Planch, ULMACEAE; a ♀ eclosed 2-II-74. We were unable to find another ♀ in nature to test the possibility of *Celtis* as an acceptable larval foodplant. Of special interest was the remarkable similiarity of this pupa to that of *Chlosyne;* it did not at all compare with the configuration of *Emesis emesia* or *Emesis tegula.* It would seem that a revisionary study should be made based on the immature stages of the various species presently assigned to this genus.

Emesis tegula (Godman & Salvin) 1886

This species was found fairly common in the area around Ciudad Mante, especially in Paso del Abra where its larval foodplant, *Pisonia aculeata* L., NYCTAGINACEAE, is abundant. My first experience with the immatures of this species came 18-XII-73 quite by chance. While collecting in Paso del Abra the recurved spines of a long branch of *P. aculeata* became caught in my clothing; as I worked to free myself I noticed a spun-up larva on the underside of a partially folded leaf. This larva pupated 20-XII, and a ♀ emerged 2-I-74. Another larva was collected at this location 23-XII-73 which pupated 10-I-74, and a ♂ emerged 19-I-74. Still another larva was collected on this plant in the same vicinity 4-I-74 which pupated in due course, and a ♀ emerged 21-I-74.

On 23-XII-73 in Paso del Abra, a ♀ was observed to oviposit on *P. aculeata;* the ♀ escaped capture, but the egg was recovered which had been deposited in the leaf axil. Later the same day another ♀ was seen and collected which deposited 60 or more eggs in confinement on *P. aculeata* 23-30-XII-73. These eggs started hatching 6-I-74. The larvae ate *P. aculeata* foliage, and 18 pupated 13-22-II-74; 10 adults (4♂, 6♀) emerged 23-25-II-74. A good series of all immature stages was preserved, including 6 pupae from 21 & 22-II. The pupal characteristics of this species are like *E. emesia.*

Lymnas pixe pixe (Boisduval) 1836

This riodinid was first collected in the United States by O. O. Stout, a ♂, 21-II-56, Brownsville, Cameron Co., Texas; this specimen, in the USNM, bears accession number 77635. The larval foodplant and life history were discovered and worked out in 1957 (unpublished) by Elbert W. Jackson and Charles R. Kodoma, both with the U. S. Department of Agriculture at the time. They had first observed the species associated with *Pithecellobium dulce* (Roxb.) Benth., LEGUMINOSAE, in Matamoros, Tamaulipas, Mexico. In Brownsville, 14-VI-57, they collected 2 larvae and 2 pupae on the foliage of *P. dulce,* locally called guamúchil tree, an introduced ornamental. The pupae produced 2 ♀; these adults with the 2 preserved larvae are in the USNM, accession nos. 78672 and 78673, respectively.

Jack E. Lipes, then of Brownsville and associated professionally with Jackson and Kodoma, collected 5 adults; 11-VII-59 (1♀), 20-VIII-60 (1♂), 21-VIII-61 (1♀), 22-VIII-61 (1♂, 1♀). At this time, Lipes published the first record for the United States, News Lepid. Soc. (1960 Season's Summary) 4:6, 1961. On 24-XII-61 Lipes also collected at Brownsville, 14 3rd and 4th instar larvae feeding on *P. dulce.* Seven of these larvae were parasitized by tachinid flies; the others pupated in due course, and adults emerged 8-10-I-62. The most recent Brownsville record is 18-X-74, JBV.

At Ciudad Mante and vicinity, *L. pixe* is one of the more common riodinids. Although several species of *Pithecellobium* grow in the area, the insect was found associated only with *P. dulce.* On 25-I-74, 1 larva was found eating this plant; it pupated 9-II, and a ♂ emerged 18-II-74. Another larva and a pupal case being eaten by ants were collected and preserved 21-II-74. On 8-XI-74 a ♀ was observed, late afternoon, demonstrating oviposition behavior around a small *P. dulce* shrub. The captured ♀, confined in a jar with a sprig of the foodplant, deposited 15 eggs 12-XI on paper toweling covering the jar, none on the foodplant. The eggs hatched 19-XI; larvae ate *P. dulce,* and 6 pupated 18-20-XII. Four adults (2♂, 2♀) emerged 27-28-XII-74. Examples of all immature stages were preserved. Once again, 22-XI-74 at 1615 hrs., a ♀ was observed ovipositing on the branches near the ground of a small *P. dulce.* No attempt was made to collect either adult or egg.

ACKNOWLEDGMENTS

I wish to thank Jack E. Lipes, U. S. Department of Agriculture, and William M. Rabenstein, Big Bend National Park, William T. Krummes and Robert F. Stephens, U. S. Department of the Interior, and the Texas Parks and Wildlife Department, for issuing or causing to be issued necessary importation and research permits pertaining to parts of this research, and for many personal considerations. To Barton H. Warnock, Sul Ross State University, B. L. Turner and M. C. Johnston, U. T. Austin, and C. L. Lundell, U. T. Dallas, I'm indebted for making or confirming some of the botanical determinations. I wish to thank Harry K. Clench, H. A. Freeman and Lee D. Miller for their continuing help with biological determinations. To Cyril F. dos Passos, William D. Field, Paddy McHenry, Jerry A. Powell, and Frederick H. Rindge I extend many thanks for providing certain references and data on museum specimens. To Sr. & Sra. Carlos Gonzales very special thanks for permitting Mrs. Kendall and me to conduct field studies at Rancho Pico de Oro, and for their warm hospitality.

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